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09/025,635 02/18/98 PANG

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EXAMINER

ZAGHMOUT, O

ART UNIT

PAPER NUMBER

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

**Office Action Summary**Application No.  
**09/025,635**Applicant(s)  
**Pang et al.**Examiner  
**Ousama Zaghmout**Group Art Unit  
**1638**☒ Responsive to communication(s) filed on Dec 9, 1999☐ This action is **FINAL**.☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

**Disposition of Claims**☒ Claim(s) 1-92 is/are pending in the application.Of the above, claim(s) 2-18, 20-45, and 82-92 is/are withdrawn from consideration.☐ Claim(s) \_\_\_\_\_ is/are allowed.☒ Claim(s) 1, 19, and 46-81 is/are rejected.☐ Claim(s) \_\_\_\_\_ is/are objected to.☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.**Application Papers**☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.☐ The specification is objected to by the Examiner.☐ The oath or declaration is objected to by the Examiner.**Priority under 35 U.S.C. § 119**☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been received.☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).**Attachment(s)**☒ Notice of References Cited, PTO-892☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 4 and 6☐ Interview Summary, PTO-413☒ Notice of Draftsperson's Patent Drawing Review, PTO-948☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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**DETAILED OFFICE ACTION**

1. The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 1638.

2. The amendment filed 12-9-1999 has been received and entered (Paper No. 12).

3. A copy of the signed IDS (1449 form) is enclosed

4. Notice of drafts person's patent drawing review (PTO 948) is enclosed.

5. Status of the claims:

Applicant's election with traverse of Group III, Claims 1, 19, 46-81 in Paper No. 12. is acknowledged. The traversal is on the ground(s) that Group I to VI include the invention of claim 1. This is not found persuasive because subject matter can be "related" and yet still be "independent" or patentability distinct. In the instant situation, the invention of Group III entails the use silencer DNA molecules which encode RNA molecules that are long enough to impart the trait are both independent and patentability distinct from the inventions of other groups as detailed in the previous Office action. Clearly, the invention in each Group is independent since you could practice one invention, e.g., the use silencer DNA molecules which encode RNA molecules that are long enough to impart the trait, without practicing or infringing any of the others. Similarly, each is patentability distinct since they constitute

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different products which can each support its own patent. Since claim 1 is present in elected and non-elected Groups, it was examined to the extent that it reads in the elected invention.

The requirement for restriction is still deemed proper and is therefore made FINAL.

6. The Examiner informed Mr. Dennis M. Connolly, the Applicants' representative, in a phone conversation in 3-2-2000 that claim 19 should be depending on claim 1 rather than claim 2 as written in the claim. He agreed with the Examiner. As such, claim 19 was examined on the merit in this case as depending on claim 1 rather than claim 2. A corrected is requested.

7. Status of the claims:

Claims 1, 19, 46-81 were examined on the merit in this Office action. Claims 2-18, 20-45, 82-92 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 12.

### **Claim Rejections - 35 USC § 112**

#### **Ist paragraph**

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly

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connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 19, 46-81 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for making the gene fusion using fragments of the N gene with either the nucleotide sequence of GFP or TUMV-CP, does not reasonably provide enablement for making a DNA construct comprising a fusion gene comprising any trait DNA molecule which has any length that is insufficient to impart any desired trait to any plant transformed with said trait DNA molecule and any silencer DNA molecule operatively coupled to said trait DNA molecule, wherein said trait DNA molecule and said silencer DNA molecule collectively impart any trait to plants transformed with said DNA construct. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Applicants broadly claim a DNA construct comprising a fusion gene comprising a trait DNA molecule which has a length that is insufficient to impart a desired trait to plants transformed with said trait DNA molecule and a silencer DNA molecule operatively coupled to said trait DNA molecule, wherein said trait DNA molecule and said silencer DNA molecule collectively impart the trait to plants transformed with said DNA construct. However, the

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specification is enabling only for making the gene fusion using fragments of the N gene with either the nucleotide sequence of GFP or TUMV-CP. However, as the physical structure along with the chemical properties of each gene varies, A person with skill in the art has to work out the conditions which are optimal for each gene encompassed by the claims of this application. Furthermore, a person with skill in the art has to test these deletion constructs at the plant level to determine that the length of the trait DNA molecule is not sufficient to impart a desired trait and determine that when fused to the silencer DNA molecule will collectively impart the trait to plants transformed with said DNA constructs. The identification of each deletion from each gene prior to the fusion and the transformation into plant for testing is essential and entails massive number of experiments. Under such condition, a person with skill in the art would be required to conduct large quantity of experimentations to obtain the full working scope of the intended claims. The specification does not convey that applicants possess these gene products with respect to the scope of the claimed invention. Moreover, this number of experiments would increase more when inducible, tissue specific promoter or developmentally expressing promoters are used. The specification may contain only a statement that these materials are part of the invention, and may convey to a potential method for obtaining the claimed materials. In addition, the specification is silent as to the criteria used to select the nucleotide sequence for making the DNA construct and in the absence of any teachings of said criteria it would require undue experimentation to obtain the full scope of the intended claims.

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Furthermore, the reduction to practice of a transgenic plant with express genes which encode foreign protein is required for the enablement of invention as claimed in this application. This is because the expression of a transgene does not depend only on the integration into the host genome, said transgene has to be activated which is then has to go through a number of steps such as the initiation of transcription, transcript process, transport to cytoplasm and translation of mRNA. As such, it is unpredictable if all of these genes will be expressed in order to be able to obtain the desired phenotype as encompassed by the claimed invention..

Applicants have failed to address many of these important issues which are essential for the enablement of the invention as claimed in the instant application. Applicants have provided no specific guidance as to how to select the nucleotide sequences which will produce a protein or a polypeptide conferring the desired effect. One wishing to practice the invention is left to proceed through trial-and-error to see what will work and what will not. Hence, due to the lack of any working examples of the inventions, and the inability of one skilled in the art to predict which if any of all possible nucleic acid molecules which will be useful in the manner suggested, and the unpredictability of the field, it would require undue experimentation to practice the claims.

In view of the breadth of the claims, unpredictability, lack of guidance in the specification of the results as stated above, it is the examiner's position that one skilled in the

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art to which it pertains, or with which it is most nearly connected, could not practice the invention commensurate in scope with these claims without undue experimentations.

**2nd paragraph**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 19, 46, 47, 54, 59, 66-68, 70-71, 77-79 and dependent claims 48-53, 55-58, 60-65, 69-70, 72-76, 80-81 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. Claims 1, 54, 66-68, 77-79 and dependent claims 19, 46-53, 55-65, 69-76, 80-81 are rejected under 35 U.S.C. 112, second paragraph as being vague and indefinite for the recitation of “silencer” or “silencing” as it is not clear if the Applicants’ intention is to encompass antisensing a gene, co-suppression of a gene, mutating a gene or other unknown meanings.

2. Claims 1, 19, 46-47, 59, 70-71 and dependent claims 48-58, 60-69, 72-81 are rejected under 112 second paragraph, as being vague and indefinite for the recitation of “impart” or “imparting” as it is not clear if the Applicants’ intention is to encompass imposing the expression, reducing the expression, increasing the expression or other unknown meanings.

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**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 19, 59, 63-65, 67-69 are rejected under 35 U.S.C. 102(b) as being anticipated by Seymour et al (Plant Molecular Biology. 1993. Vol. 23:1-9).

The claims are directed to a DNA construct comprising a fusion gene that is made of a trait DNA molecule which has a length that is sufficient to impart a desired trait to plants transformed with said trait DNA and a silencer DNA molecule operatively coupled to said trait DNA molecule which are collectively impart the trait to plants transformed with said DNA construct, and transgenic plants therefrom.

The claimed inventions read on Seymour et al as follows:

The reference teaches tomatoes (*Lycopersicon esculentum* Mill cv. Ailsa Craig) transformed with a gene construct having 244 bp of the 5' end of a polygalacturonase (PG) cDNA, coding for a 71 amino acid N-terminal extension to the mature protein (a trait DNA molecule which has a length insufficient to impart desired trait to plant), fused to 1320 bp of a pectin-esterase (PE)

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cDNA encoding the full sequence of the mature PE protein ( a silencer DNA molecule) ( see lines 1-3, Abstract; Figure 1, page 2). This chimeric gene was inserted in a sense orientation between a CaMV 35S promoter and terminator for constitutive expression (Figure 1, page 2). The plant genetic trait taught by the reference is encoded by polygalacturonase and pectinase, trait plant DNA molecules (introduction, lines 1-2, page 1). Both enzymes effect color and enzyme production as both are pectolytic enzymes found in ripening tomato fruit and are involved in pectin degradation and softening of the fruit (first paragraph in the Introduction section, page 1). The reference teaches the down regulation of both enzymes in transgenic plant (Figure 3, page 6). As such, the gene which encodes each one of these enzyme act as silencer DNA molecule in transgenic plant taught by the reference. The cDNA molecules taught by the reference encode RNA molecules which are translatable and untranslatable (Figures 3 and 4, page 6). The reference does teach propagating a plant from the transgenic plant seed (last paragraph, column 1, page 7). Thus, the reference teaches each and every element as claimed in the instant invention.

2. Claims 46-47, 51-58, 70-71, 75, 78-81 are rejected under 35 U.S.C. 102(b) as being anticipated by Seymour et al (Plant Molecular Biology. 1993. Vol. 23:1-9).

The claims are directed to a method of imparting a trait to plants comprising transforming a plant with DNA construct comprising a fusion gene that is made of a trait DNA molecule which has a length that is sufficient to impart a desired trait to plants transformed with said trait DNA

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and a silencer DNA molecule operatively coupled to said trait DNA molecule which are collectively impart the trait to plants transformed with said DNA construct, and a method of making transgenic plants with said DNA construct.

The claimed inventions read on Seymour et al as follows:

The reference teaches a method of making transgenic tomato plants (Lycopersicon esculentum Mill cv. Ailsa Craig) by transforming with a with a gene construct having 244 bp of the 5' end of a polygalacturonase (PG) cDNA, coding for a 71 amino acid N-terminal extension to the mature protein (a trait DNA molecule which has a length insufficient to impart desired trait to plant), fused to 1320 bp of a pectin-esterase (PE) cDNA encoding the full sequence of the mature PE protein (a silencer DNA molecule) (see column 2 page 2 bridging to column 1 of page 3, see also lines 1-3, Abstract; Figure 1, page 2). The reference teaches a method for making chimeric gene which was inserted in a sense orientation between a CaMV 35S promoter and terminator for constitutive expression (Figure 1, page 2). The plant genetic trait taught by the reference is encoded by polygalacturonase and pectinase, trait plant DNA molecules (introduction, lines 1-2, page 1). Both enzymes effect color and enzyme production as both are pectolytic enzymes found in ripening tomato fruit and are involved in pectin degradation and softening of the fruit (first paragraph in the Introduction section, page 1). The reference teaches the down regulation of both enzymes in transgenic plant (Figure 3, page 6). As such, the gene which encodes each one of these enzyme act as a silencer DNA molecule in transgenic plant taught by the reference. The cDNA molecules taught by the reference encode RNA molecules

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which are translatable and untranslatable (Figures 3 and 4, page 6). The reference does teach a method for propagating a plant from the transgenic plant seed (last paragraph, column 1, page 7). Thus, the reference teaches each and every element as claimed in the instant invention.

**Claim rejections-35 U.S.C. § 103**

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made. Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

1. Claims 1, 19, 58-69 are rejected under 35 U.S.C. § 103 as being unpatentable over Seymour et al (Plant Molecular Biology. 1993. Vol. 23: 1-9) taken with Gonsalves et al (WO 94/16550; Date of publication: August 4, 1994).

The claims are directed to a DNA construct comprising a fusion gene that is made of a trait DNA molecule which has a length that is sufficient to impart a desired trait to plants transformed with said trait DNA and a silencer DNA molecule operatively coupled to said trait DNA molecule which are collectively impart the trait to plants transformed with said DNA construct, and transgenic plants therefrom. The claims also encompass trait DNA molecule that is a plant viral cDNA molecule which encodes a viral disease resistance.

The reference teaches tomato plants (Lycopersicon esculentum Mill cv. Ailsa Craig) transformed with a gene construct having 244 bp of the 5' end of a polygalacturonase (PG) cDNA, coding for a 71 amino acid N-terminal extension to the mature protein (a trait DNA molecule which has a length insufficient to impart desired trait to plant), fused to 1320 bp of a pectin-esterase (PE) cDNA encoding the full sequence of the mature PE protein (a silencer DNA molecule) ( see lines 1-3, Abstract; Figure 1, page 2). This

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chimeric gene was inserted in a sense orientation between a CaMV 35S promoter and terminator for constitutive expression (Figure 1, page 2). The plant genetic traits taught by the reference are encoded by polygalacturonase and pectinase (trait plant DNA molecules) (Introduction, lines 1-2, page 1). Both enzymes effect color and enzyme production as both are pectolytic enzymes found in ripening tomato fruit and are involved in pectin degradation and softening of the fruit (first paragraph in the Introduction section, page 1). The reference teaches the down regulation of both enzymes in transgenic plant (Figure 3, page 6). As such, the gene which encodes each one of these enzyme act as a silencer DNA molecule in transgenic plant taught by the reference. The cDNA molecules taught by the reference encode RNA molecules which are translatable and untranslatable (Figures 3 and 4, page 6). The reference does teach propagating a plant from the transgenic plant seed (last paragraph, column 1, page 7). However, the reference does not teach a DNA construct and resulting transgenic plants wherein trait DNA molecule is a plant viral cDNA molecule which encodes a viral disease resistance.

Gonsalves et al teaches transgenic plants containing the nucleocapsid nucleotide sequence from tomato spotted wilt virus (TSWV) wherein said transgenic plants were resistant to Tospoviruses (lines 1-2, Abstract; see also Example VII)

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Given the recognition of those of ordinary skill in the art of the value of engineering the down-regulation of two or perhaps more genes with a single construct to suppress a variety of different genes in one step as stated by Seymour et al (lines 6-13 from the bottom, column 2, page 7), it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teaching of Seymour et al produce transgenic plants that can produce tomato can be stored for a long time as a result of the down regulation of the PC and PE genes. Furthermore, it would have been obvious to replace the PC and PG genes taught by Seymour et al with 2 of the nucleotide sequences taught by Gonsalves et al in order to produce transgenic plants that are resistant to large number of viruses at the same time. In addition, the invention can be easily made by a person of ordinary skills in the art by incorporating a sequence which encodes a retention signal (a DNA molecule which has a length that is insufficient to impart a desired trait to plants) into any of the sequences taught by Gonsalves et al. The expectation would have been the successful expression of the fusion constructs in transgenic plants since Seymour et al teaches the expression of two non-homologous genes using a single gene construct. The use of other genes which encode a plant viral resistance phenotype is a matter of choice unless the criticality is provided. In addition, the transformation system taught by the references can easily be used by a person of ordinary skill in the art to transform other plant species that are encompassed by the claims of the instant invention. Thus the claimed invention would

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have been prima facie obvious as a whole at the time it was made, especially in the absence of evidence to the contrary.

2. Claims 46-57, 70-81 are rejected under 35 U.S.C. § 103 as being unpatentable over Seymour et al (Plant Molecular Biology. 1993. Vol. 23: 1-9) taken with Gonsalves et al (WO 94/16550; Date of publication: August 4, 1994).

The claims are directed to a method of imparting a trait to plants comprising transforming a plant with DNA construct comprising a fusion gene that is made of a trait DNA molecule which has a length that is sufficient to impart a desired trait to plants transformed with said trait DNA and a silencer DNA molecule operatively coupled to said trait DNA molecule which are collectively impart the trait to plants transformed with said DNA construct, and a method of making transgenic plants with said DNA construct. The claims also encompass a method of transforming plant with trait DNA molecule that is a plant viral cDNA molecule which encodes a viral disease resistance.

The reference teaches a method of making transgenic tomato plants (Lycopersicon esculentum Mill cv. Ailsa Craig) by transforming with a with a gene construct having 244 bp of the 5' end of a polygalacturonase (PG) cDNA, coding for a 71 amino acid N-terminal extension to the mature protein (a trait DNA molecule which has a length insufficient to impart desired trait to plant), fused to 1320 bp of a pectin-esterase (PE) cDNA encoding the full sequence of the mature PE protein (a silencer DNA molecule) (

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see column 2 page 2 bridging to column 1 of page 3, see also lines 1-3, Abstract; Figure 1, page 2). The reference teaches a method for making chimeric gene which was inserted in a sense orientation between a CaMV 35S promoter and terminator for constitutive expression (Figure 1, page 2). The plant genetic trait taught by the reference is encoded by polygalacturonase and pectinase, trait plant DNA molecules (introduction, lines 1-2, page 1). Both enzymes effect color and enzyme production as both are pectolytic enzymes found in ripening tomato fruit and are involved in pectin degradation and softening of the fruit (first paragraph in the Introduction section, page 1). The reference teaches the down regulation of both enzymes in transgenic plant (Figure 3, page 6). As such, the gene which encodes each one of these enzyme act as a silencer DNA molecule in transgenic plant taught by the reference. The cDNA molecules taught by the reference encode RNA molecules which are translatable and untranslatable (Figures 3 and 4, page 6). The reference does teach a method for propagating a plant from the transgenic plant seed (last paragraph, column 1, page 7). However, the reference does not teach a method for transforming transgenic plants with a DNA construct wherein trait DNA molecule is a plant viral cDNA molecule which encodes a viral disease resistance.

Gonsalves et al teaches a method for producing transgenic plants containing the nucleocapsid nucleotide sequence from tomato spotted wilt virus (TSWV) wherein said

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transgenic plants were resistant to Tospoviruses (lines 1-2, Abstract; see also Examples V and VII)

Given the recognition of those of ordinary skill in the art of the value of engineering the down-regulation of two or perhaps more genes with a single construct to suppress a variety of different genes in one step as stated by Seymour et al (lines 6-13 from the bottom, column 2, page 7), it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teaching of Seymour et al produce transgenic plants that can produce tomato can be stored for a long time as a result of the down regulation of the PC and PE genes. Furthermore, it would have been obvious to replace the PC and PG genes taught by Seymour et al with 2 of the nucleotide sequences taught by Gonsalves et al in order to produce transgenic plants that are resistant to large number of viruses at the same time. In addition, the invention can be easily made by a person of ordinary skills in the art by incorporating a sequence which encodes a retention signal (a DNA molecule which has a length that is insufficient to impart a desired trait to plants) into any of the sequences taught by Gonsalves et al. The expectation would have been the successful expression of the fusion constructs in transgenic plants since Seymour et al teaches the expression of two non-homologous genes using a single gene construct. The use of other genes which encode a plant viral resistance phenotype is a matter of choice unless the criticality is

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provided. In addition, the transformation system taught by the references can easily be used by a person of ordinary skill in the art to transform other plant species that are encompassed by the claims of the instant invention. Thus the claimed invention would have been prima facie obvious as a whole at the time it was made, especially in the absence of evidence to the contrary.

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**Future Correspondence**

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ousama M-Faiz Zaghmout whose telephone number is (703) 308-9438. The Examiner can normally be reached Monday through Friday from 7:30 am to 5:00 pm (EST).

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, L. Smith, can be reached on (703) 308-3909. The fax phone number for the group is (703) 305-3014.

Any inquiry of a general nature or relating to the status of this application should be directed to THE MATRIX CUSTOMER SERVICE CENTER whose telephone number is (703) 308-0196.

Ousama M-Faiz Zaghmout Ph.D.

March 4, 2000

ELIZABETH F. MACELWAIN  
PRIMARY EXAMINER  
GROUP 1800

